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214. Proposed by R. D. CARMICHAEL, Hartselle, Ala.

Prove that  $\pi^2 = 6 \cdot \frac{2^2}{2^2-1} \cdot \frac{3^2}{3^2-1} \cdot \frac{5^2}{5^2-1} \dots$  where the squared numbers in the numerator are the natural *primes* in order.

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### GEOMETRY.

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277. Proposed by G. W. GREENWOOD, M. A., McKendree College, Lebanon, Ill.

It is tacitly assumed in elementary geometry that as the number of sides of a regular polygon inscribed in a circle is increased, *in any manner*, that its perimeter has a fixed limit. Beginning with a square and then continually doubling the number of sides we get for the perimeter  $2^{n+2}\sqrt{[2-E^n(0)]}$ , where  $E(x) \equiv \sqrt{2+x}$ . Beginning with a hexagon we get  $2^{m+1}3\sqrt{[2-E^m(1)]}$ . The definition of the length of a circle assumes that these expressions have the same limit as  $n \rightarrow \infty$  and  $m \rightarrow \infty$ . Prove it.

278. Proposed by L. E. NEWCOMB, Los Gates, Cal.

$AF$ ,  $MN$  are parallel lines indefinitely extended toward  $FN$ ; at right angles to  $AF$ ,  $MN$  is  $AM$  of length 22; upon the base  $AB$ , which is in line with  $AM$ , is the triangle  $ABC$  whose sides are  $AB=21$ ,  $BC=10$ ,  $AC=17$ ; find the sides of the maximum similar triangle with base extending from  $B$  to some point in  $AF$ , the vertex in line with  $MN$ .

279. Proposed by C. C. WENTWORTH, C. E., Roanoke, Va.

To construct geometrically the maximum equilateral triangle circumscribed about a given triangle.

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### GROUP THEORY.

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12. Proposed by GEORGE H. HALLETT, Ph. D., Assistant Professor of Mathematics, The University of Pennsylvania.

\*Given  $U_1 = \alpha'$ ,  $V_1 = \beta'$ , and the recursion formulae  $U_y = \alpha' V_{y-1} + \alpha'' U_{y-1}$ ,  $V_y = \beta' V_{y-1} + \beta'' U_{y-1}$ . Find expressions for  $U_y$ ,  $V_y$  in terms of the coefficients  $\alpha'$ ,  $\alpha''$ ,  $\beta'$ ,  $\beta''$ .

13. Proposed by O. E. GLENN, Ph. D., Springfield, Mo.

The order of the linear homogeneous group in  $n$  letters is  $(p^n-1)(p^n-p) \dots (p^n-p^{n-1})$ . Two proofs are given in Burnside's *Finite Groups*. Give other proofs.

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\*The problem is of frequent occurrence in abstract group construction.